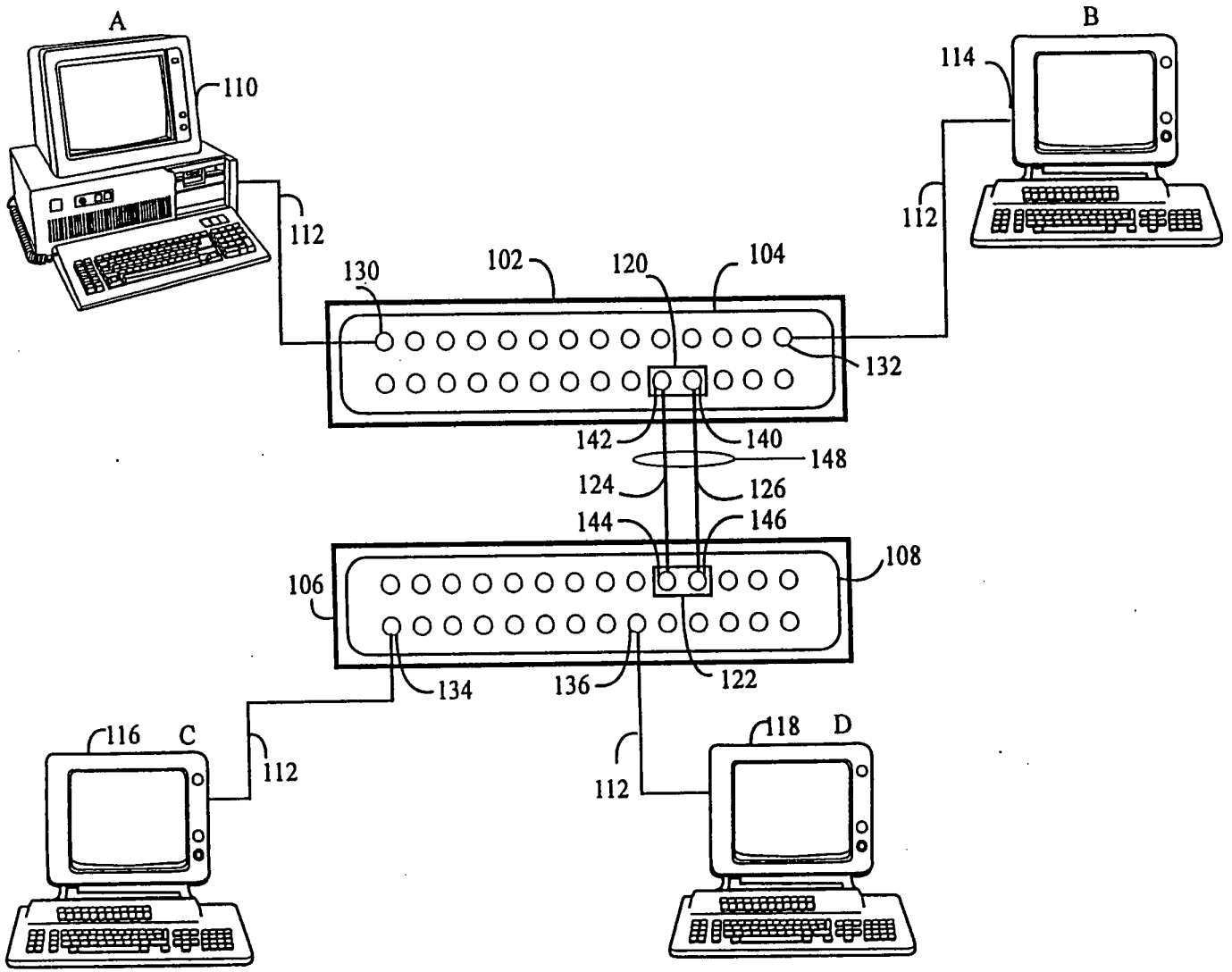

A
110
112
B
114
112
130
102
120
104
132
142
140
148
124
126
144
146
108
106
134
136
122
116
C
112
118
D
112

FIG. 1

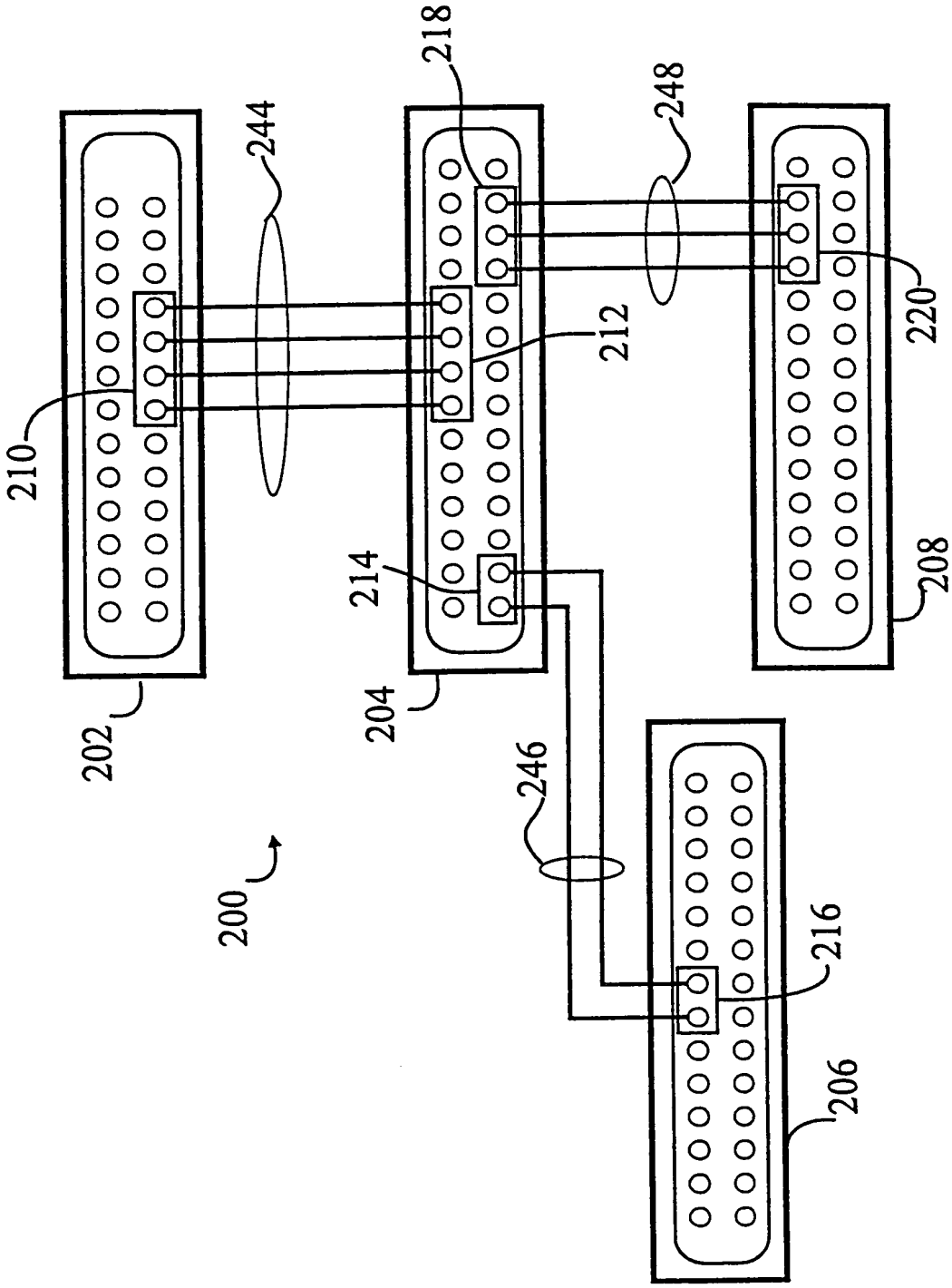


FIG.2

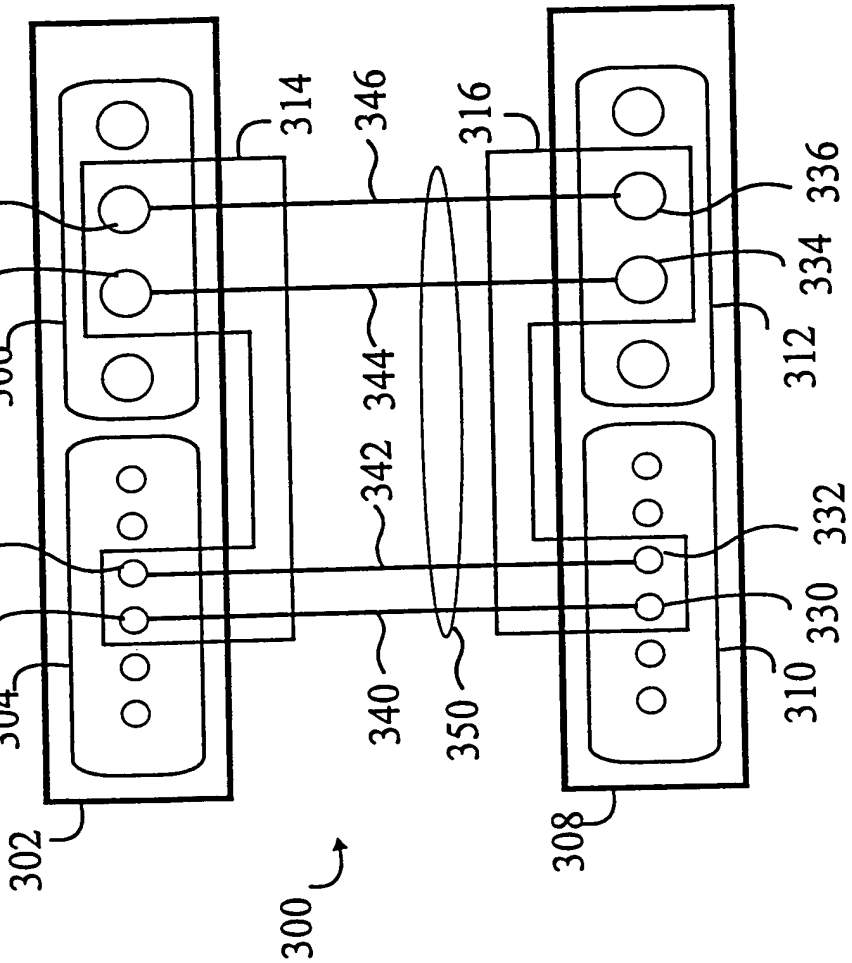

300
302
304
306
308
310
312
314
316
320
322
324
326
330
332
334
336
340
342
344
346
350

FIG.3

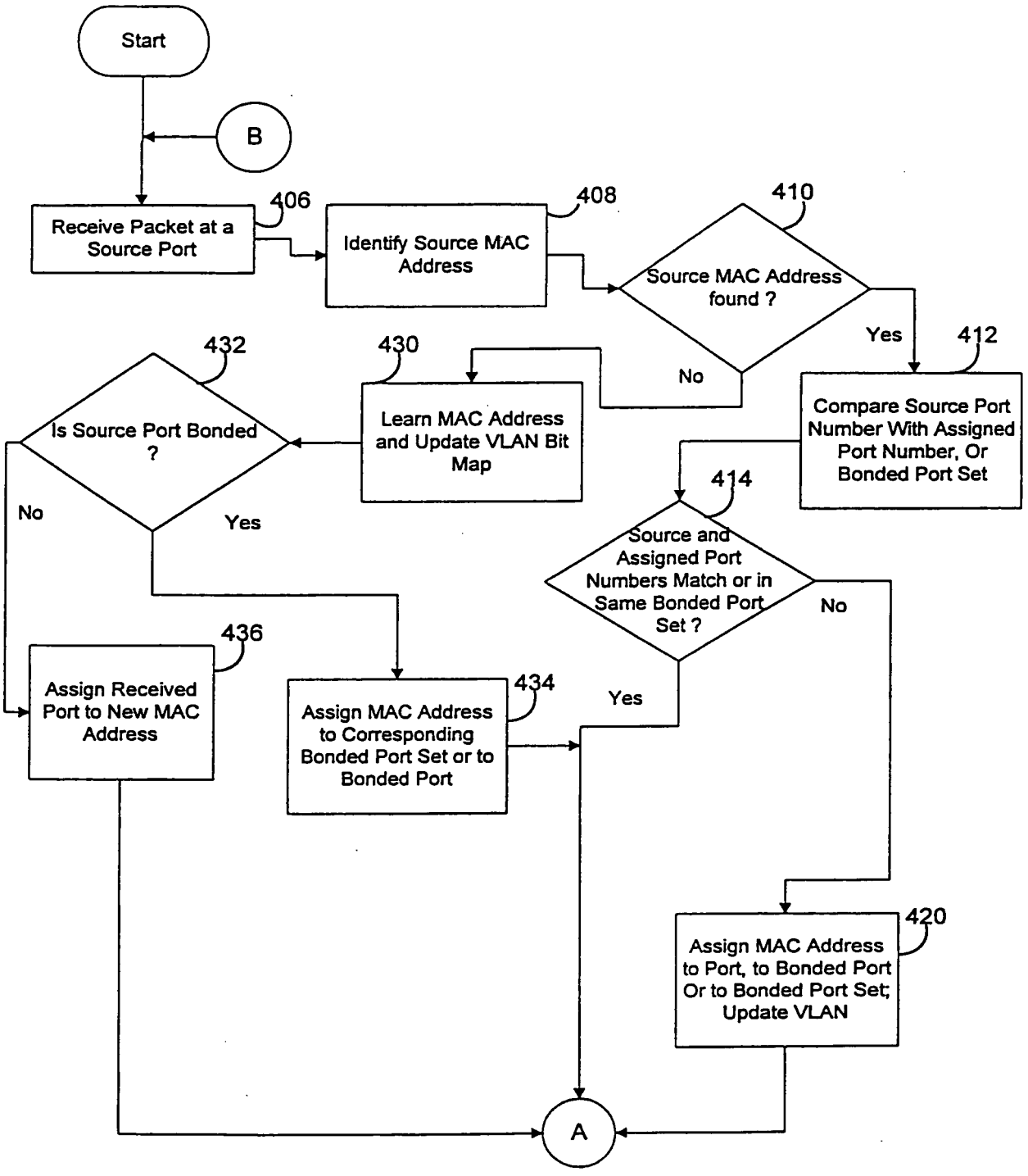

Start
B
Receive Packet at a Source Port
406
Identify Source MAC Address
408
Source MAC Address found ?
410
Yes
412
Compare Source Port Number With Assigned Port Number, Or Bonded Port Set
No
Learn MAC Address and Update VLAN Bit Map
430
Is Source Port Bonded ?
432
No
Yes
414
Source and Assigned Port Numbers Match or in Same Bonded Port Set ?
No
Yes
Assign Received Port to New MAC Address
436
Assign MAC Address to Corresponding Bonded Port Set or to Bonded Port
434
Assign MAC Address to Port, to Bonded Port Or to Bonded Port Set; Update VLAN
420
A

FIG. 4A

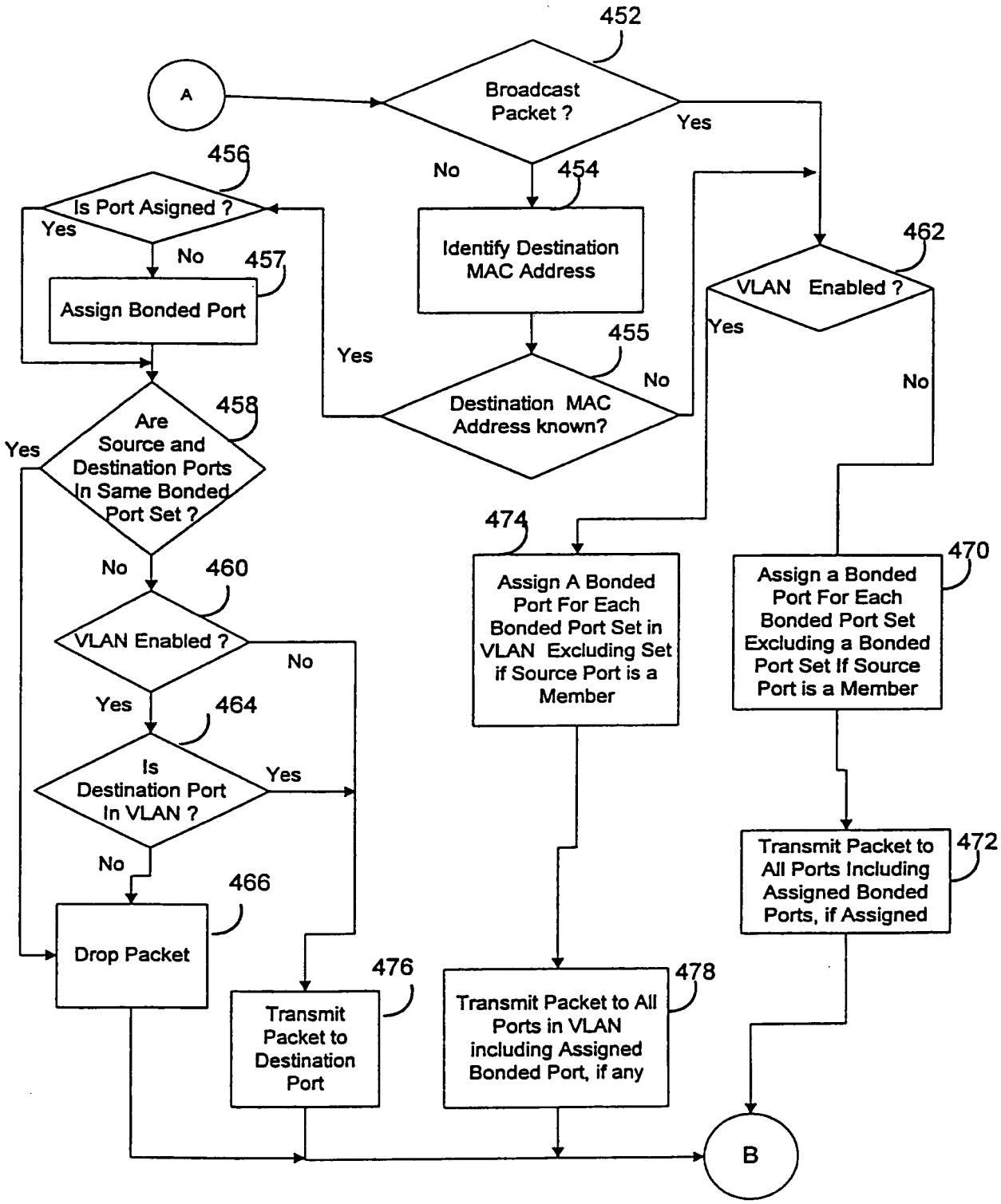
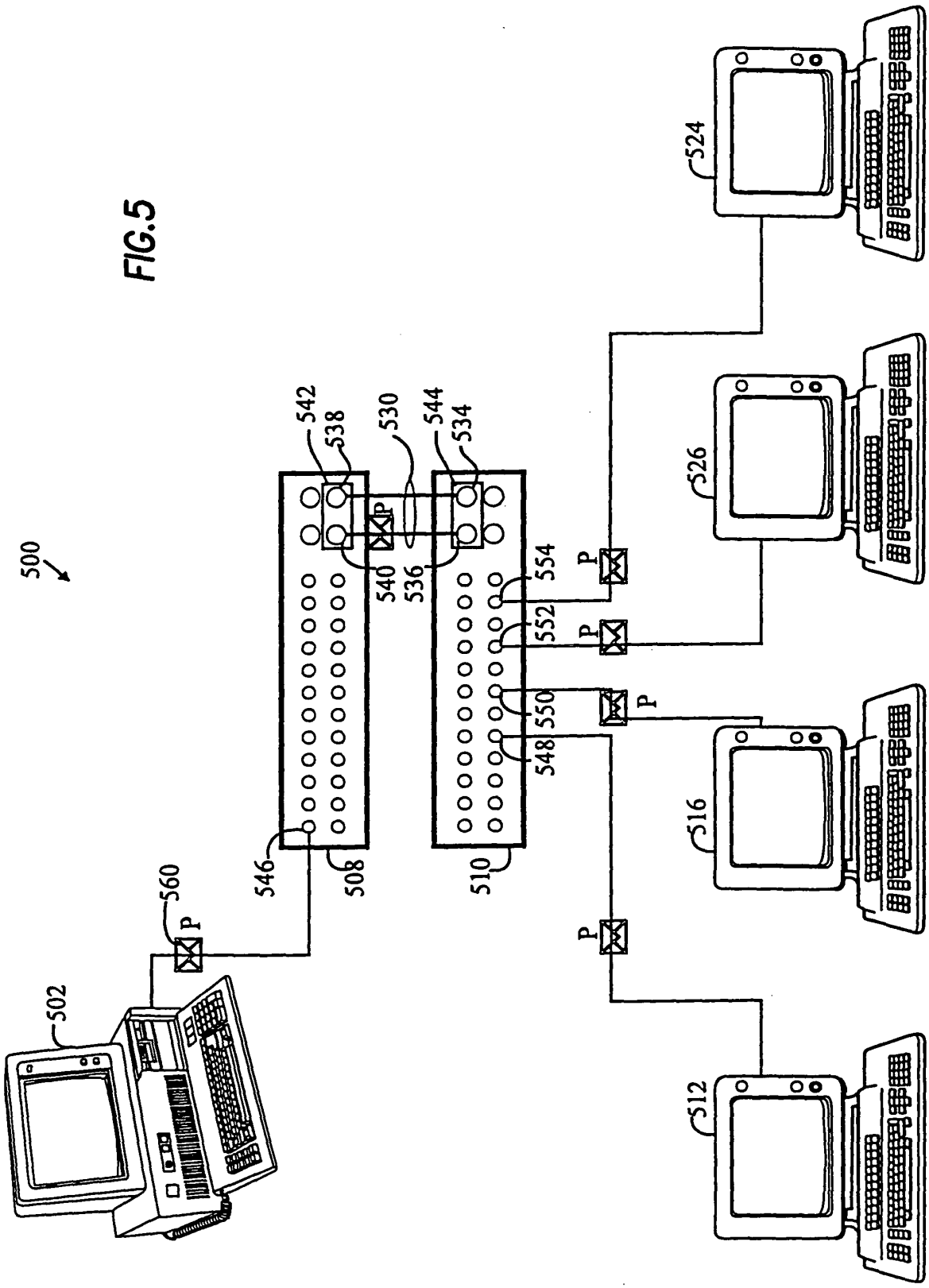

A
452
Broadcast Packet ?
Yes
No
454
Identify Destination MAC Address
455
Destination MAC Address known?
Yes
No
456
Is Port Asigned ?
Yes
No
457
Assign Bonded Port
458
Are Source and Destination Ports In Same Bonded Port Set ?
Yes
No
460
VLAN Enabled ?
Yes
No
464
Is Destination Port In VLAN ?
Yes
No
466
Drop Packet
476
Transmit Packet to Destination Port
462
VLAN Enabled ?
Yes
No
474
Assign A Bonded Port For Each Bonded Port Set in VLAN Excluding Set if Source Port is a Member
478
Transmit Packet to All Ports in VLAN including Assigned Bonded Port, if any
470
Assign a Bonded Port For Each Bonded Port Set Excluding a Bonded Port Set If Source Port is a Member
472
Transmit Packet to All Ports Including Assigned Bonded Ports, if Assigned
B

FIG.4B

FIG.5


500
502
560
P
546
508
542
538
530
540
536
544
534
510
554
552
550
548
524
526
516
512

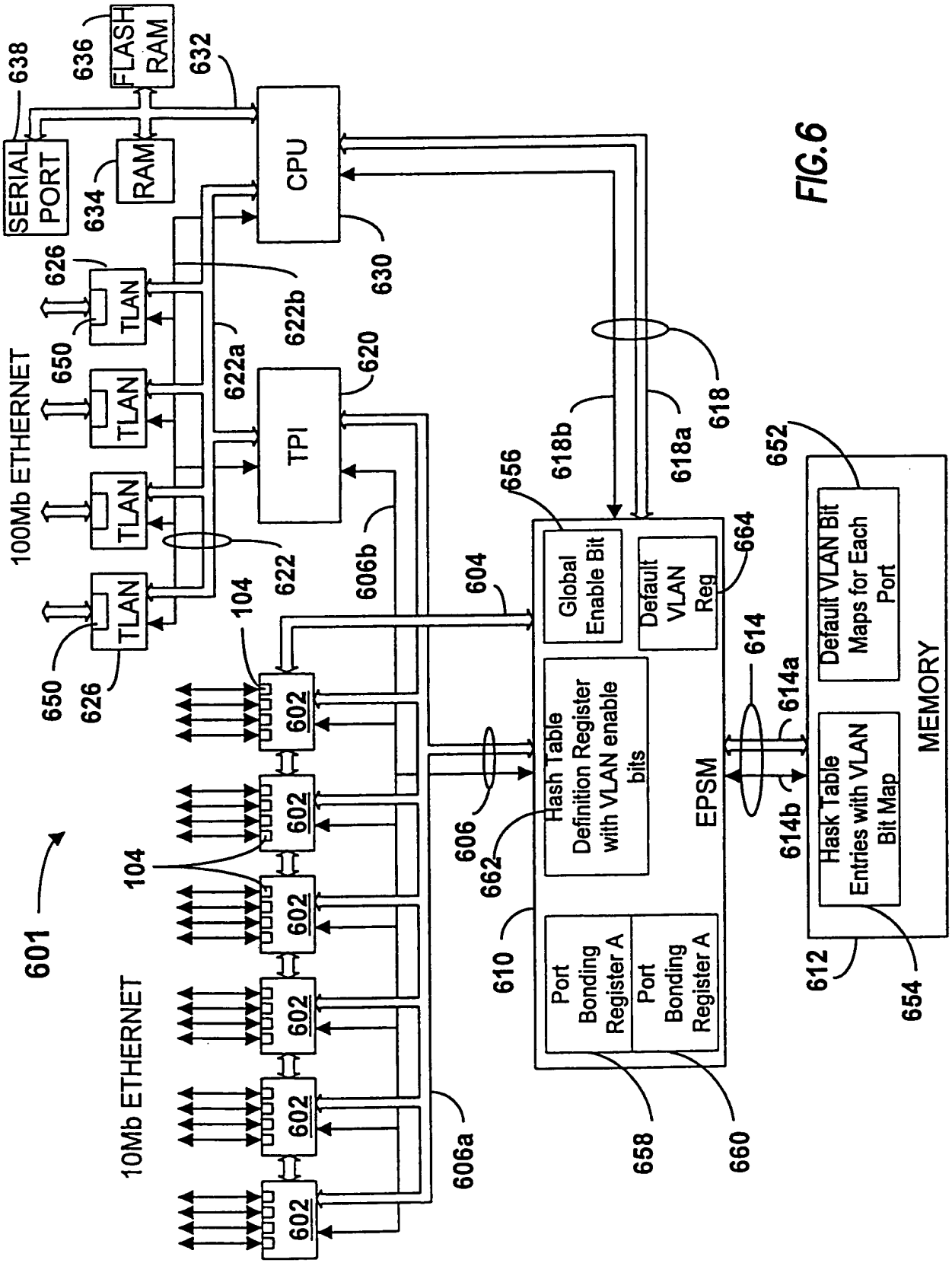

601
100Mb ETHERNET
10Mb ETHERNET
104
602
650
626
TLAN
622
622a
622b
TPI
620
606b
606
606a
604
CPU
630
632
FLASH RAM
636
RAM
634
SERIAL PORT
638
656
618
618a
618b
Global Enable Bit
Default VLAN Reg
664
614
614a
614b
Hash Table Definition Register with VLAN enable bits
662
EPSM
610
Port Bonding Register A
Port Bonding Register A
658
660
652
Default VLAN Bit Maps for Each Port
Hask Table Entries with VLAN Bit Map
MEMORY
612
654

FIG.6

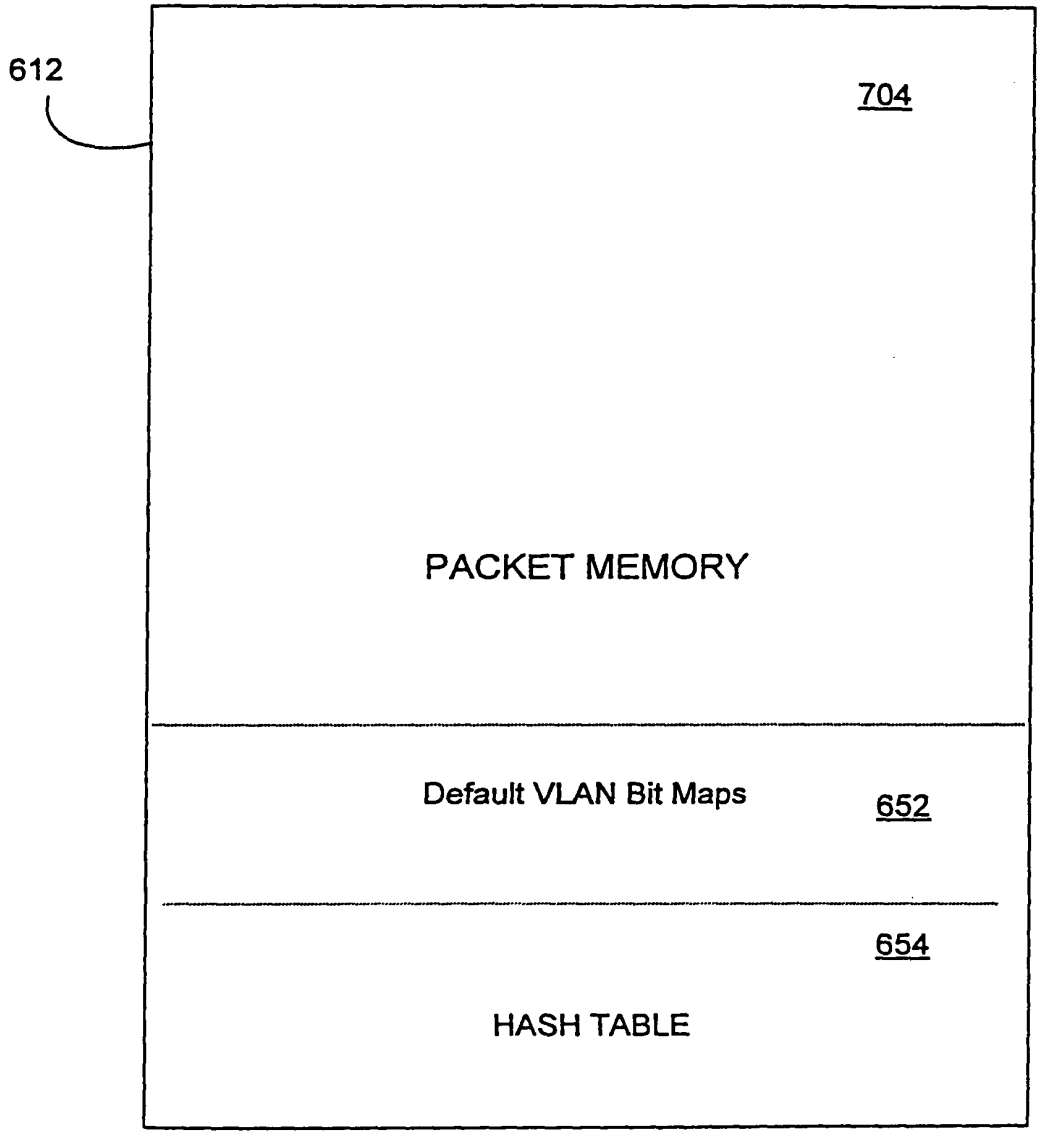
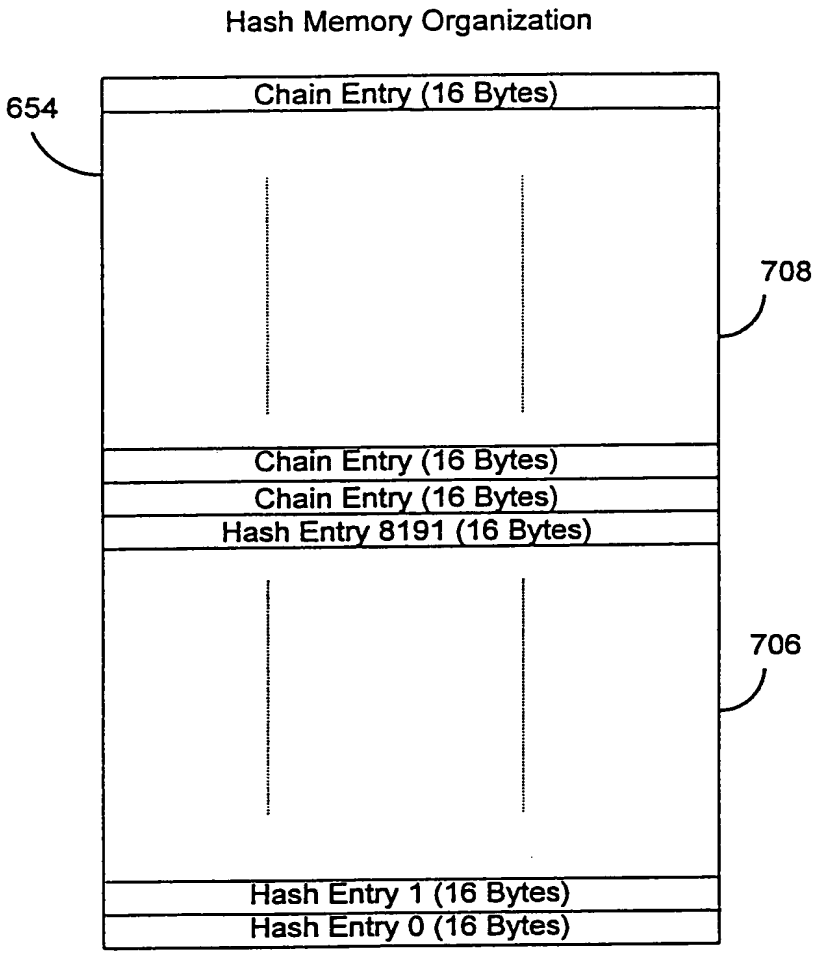

612
704
PACKET MEMORY
Default VLAN Bit Maps
652
654
HASH TABLE

FIG. 7A

FIG. 7B



710

Link A31-24	Link A23-16	Link A15-8	Link A7-4,000	Byte15-12
VLAN byte 3	VLAN Byte 2	VLAN Byte 1	VLAN Byte 0	Byte11-8
Control / Age	Port Num	Address Byte 5	Address Byte 4	Byte 7-4
Address Byte 3	Address Byte 2	Address Byte 1	Address Byte 0	Byte 3-0

FIG. 7C

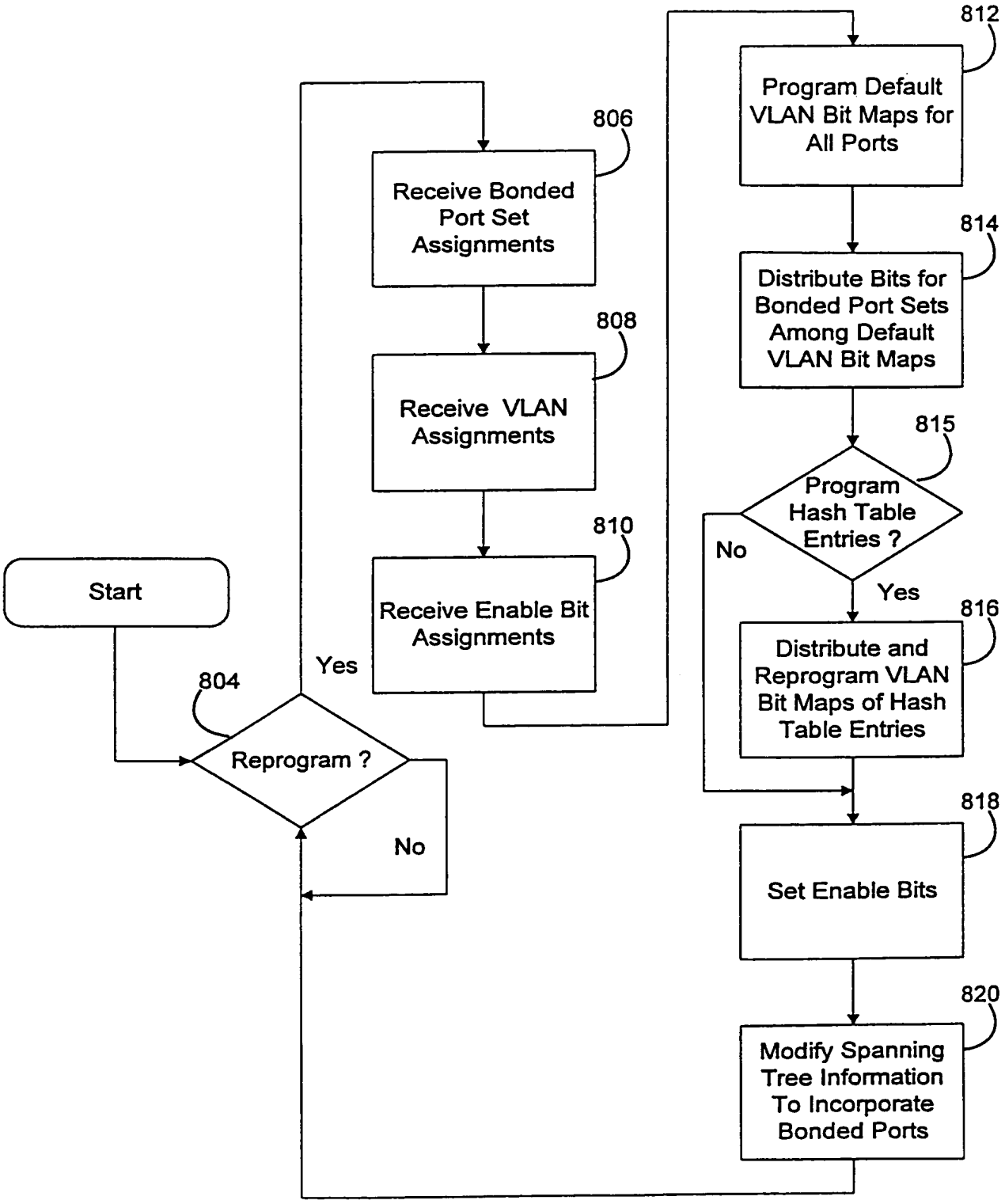

Start
804
Reprogram ?
Yes
No
806
Receive Bonded Port Set Assignments
808
Receive VLAN Assignments
810
Receive Enable Bit Assignments
812
Program Default VLAN Bit Maps for All Ports
814
Distribute Bits for Bonded Port Sets Among Default VLAN Bit Maps
815
Program Hash Table Entries ?
No
Yes
816
Distribute and Reprogram VLAN Bit Maps of Hash Table Entries
818
Set Enable Bits
820
Modify Spanning Tree Information To Incorporate Bonded Ports

FIG.8

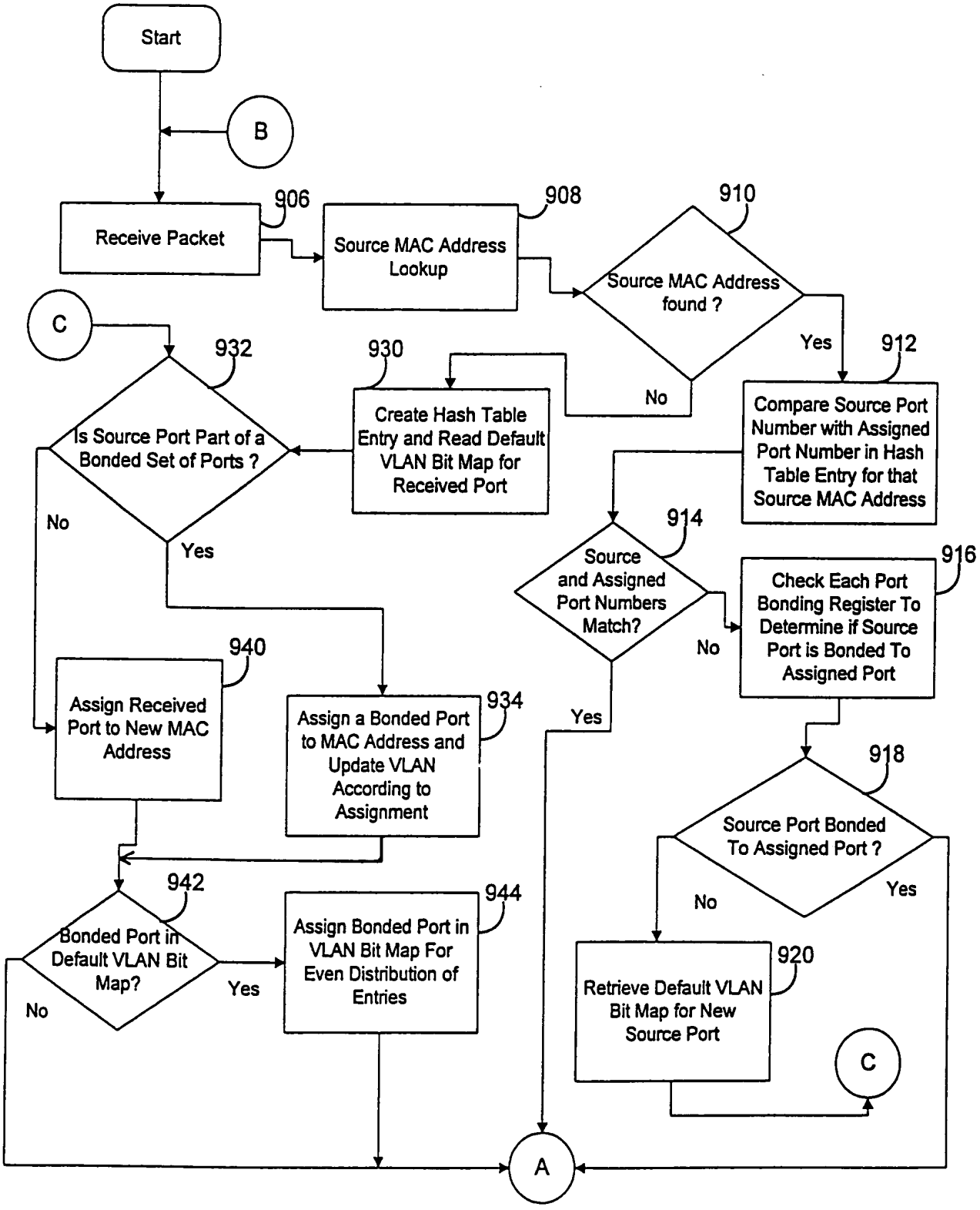

Start
B
Receive Packet
906
Source MAC Address Lookup
908
Source MAC Address found ?
910
Yes
912
Compare Source Port Number with Assigned Port Number in Hash Table Entry for that Source MAC Address
No
Create Hash Table Entry and Read Default VLAN Bit Map for Received Port
930
C
Is Source Port Part of a Bonded Set of Ports ?
932
No
Yes
Source and Assigned Port Numbers Match?
914
No
Check Each Port Bonding Register To Determine if Source Port is Bonded To Assigned Port
916
Yes
Assign Received Port to New MAC Address
940
Assign a Bonded Port to MAC Address and Update VLAN According to Assignment
934
Source Port Bonded To Assigned Port ?
918
No
Yes
Bonded Port in Default VLAN Bit Map?
942
No
Yes
Assign Bonded Port in VLAN Bit Map For Even Distribution of Entries
944
Retrieve Default VLAN Bit Map for New Source Port
920
C
A

FIG.9A

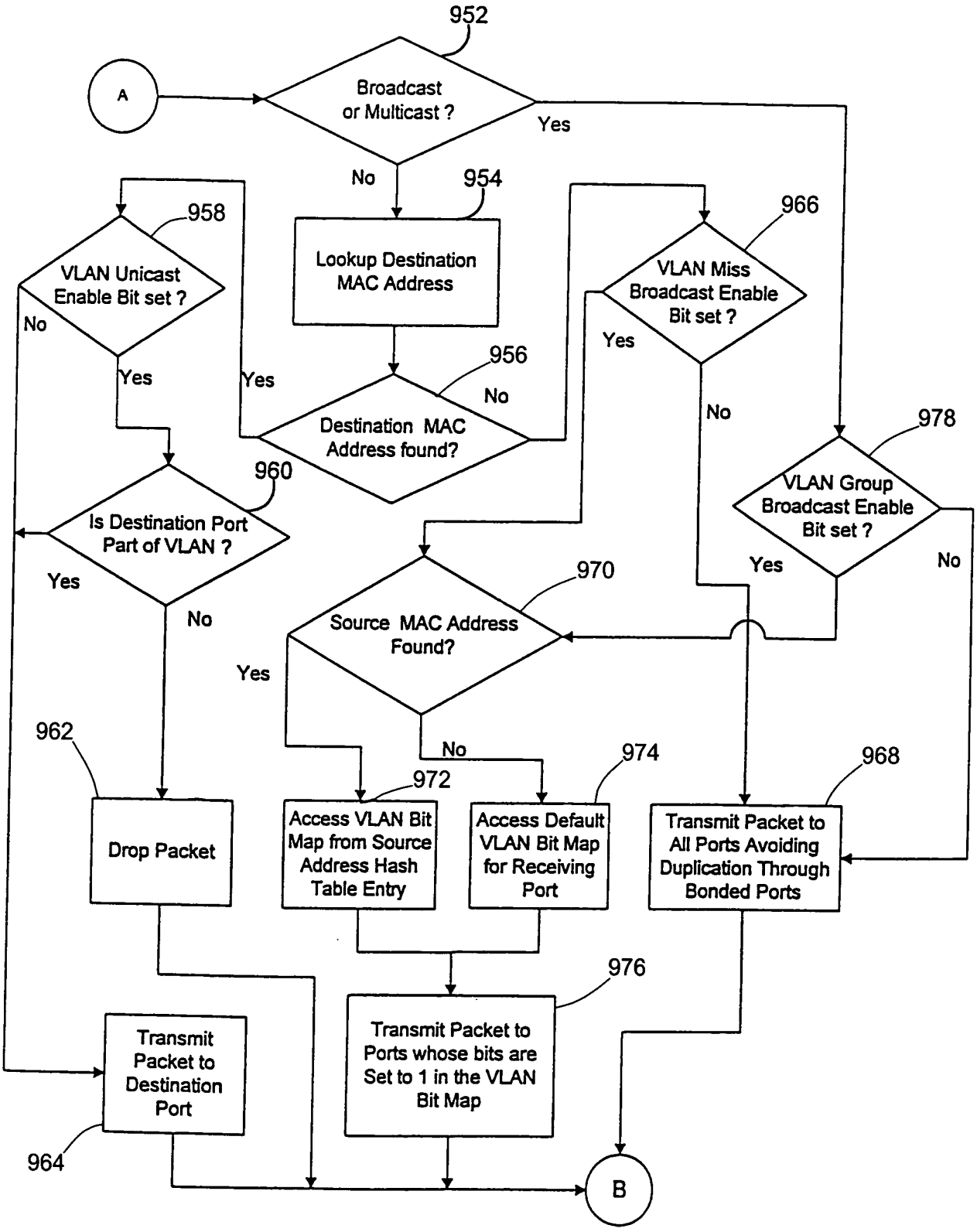

A
952
Broadcast or Multicast ?
Yes
No
954
Lookup Destination MAC Address
956
Destination MAC Address found?
No
Yes
958
VLAN Unicast Enable Bit set ?
No
Yes
960
Is Destination Port Part of VLAN ?
Yes
No
962
Drop Packet
964
Transmit Packet to Destination Port
966
VLAN Miss Broadcast Enable Bit set ?
Yes
No
970
Source MAC Address Found?
Yes
No
972
Access VLAN Bit Map from Source Address Hash Table Entry
974
Access Default VLAN Bit Map for Receiving Port
976
Transmit Packet to Ports whose bits are Set to 1 in the VLAN Bit Map
978
VLAN Group Broadcast Enable Bit set ?
Yes
No
968
Transmit Packet to All Ports Avoiding Duplication Through Bonded Ports
B

FIG.9B

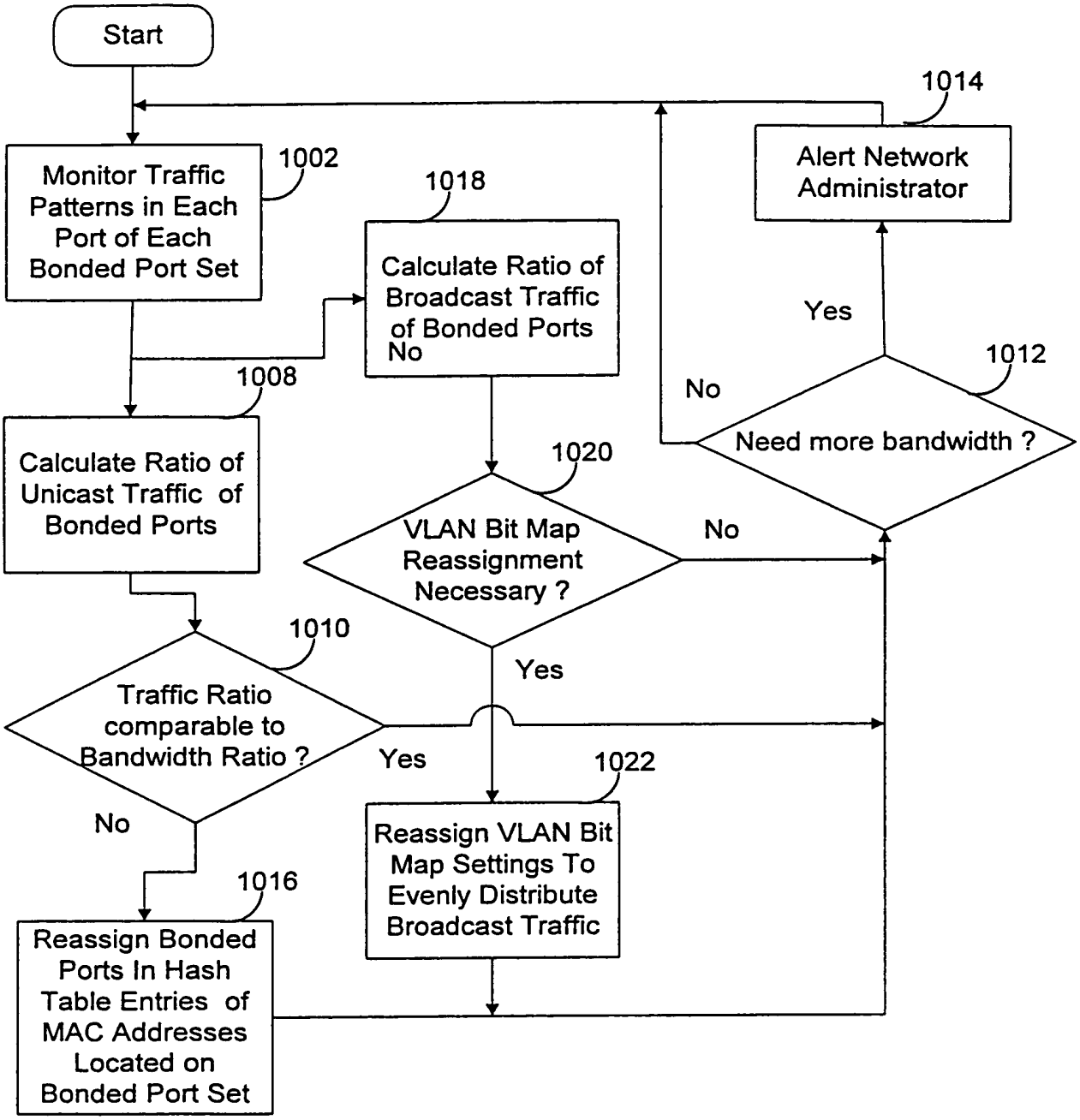

Start
Monitor Traffic Patterns in Each Port of Each Bonded Port Set
1002
Calculate Ratio of Unicast Traffic of Bonded Ports
1008
Traffic Ratio comparable to Bandwidth Ratio ?
1010
Yes
No
Reassign Bonded Ports In Hash Table Entries of MAC Addresses Located on Bonded Port Set
1016
Calculate Ratio of Broadcast Traffic of Bonded Ports
1018
No
VLAN Bit Map Reassignment Necessary ?
1020
Yes
Reassign VLAN Bit Map Settings To Evenly Distribute Broadcast Traffic
1022
Need more bandwidth ?
1012
Yes
No
Alert Network Administrator
1014

FIG. 10